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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OFFICIAL

Docket No. 15341US02

*In the Application of:*

VandenBiesen et al.

U.S. Serial No.: 10/643,330

Confirmation No.: 3981

Filed: August 19, 2003

**For:** METHOD OF MAKING SYNTHETIC  
GEMS COMPRISING ELEMENTS  
RECOVERED FROM REMAINS OF A  
SPECIES OF THE KINGDOM  
ANIMALIA

*Examiner:* Unassigned*Group Art Unit:* 1755**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is  
being facsimile transmitted to the Patent and  
Trademark Office on March 3, 2004 to  
Facsimile No. (703) 872-9306.

By:

  
George Wheeler

Reg. No. 28,766

**Second Declaration of Dr. Robert W. Froberg  
Under 37 CFR 1.132**

I, Dr. Robert W. Froberg, hereby declare the following:

1. On July 15, 2003, I provided a declaration related to the subject matter of this patent application. On information and belief, the applicants submitted that prior declaration to support a patent application, Ser. No. 10/100,666, which is related to the present application identified above. My credentials as an expert are stated in the first paragraph of my prior declaration.
2. The applicants have asked me to provide a second declaration to summarize the results of experimental work I did at the request of the applicants to show the surprising results obtained according to the invention.
3. I conducted the experiment as described in Attachment A. Attachment A is incorporated here by reference.
4. Referring to the second page of Attachment A, I obtained the results stated in the following Table, working with cremated remains provided by the applicants.

Sample:	A	B	C	D
Weight of crucible:	509.90	517.72	509.40	510.00
Plus: Weight of carbon added:	0.00	19.98	0.00	20.00
Plus: Weight of cremated remains added:	0.00	0.00	50.00	50.00
Total weight before reaction	509.90	537.70	559.40	580.00
Less: Total weight after reaction:	509.10	536.50	509.20	533.50
Gross Change in weight during reaction:	0.80	1.20	50.20	46.50
Actual carbon recovery (B&D incl. added carbon)	0	19.60	15.10	20.00

5. Sample A shown in the Table, which was an empty graphite crucible subjected to the purification process, showed only a slight weight loss (0.80 g) during the purification process. On information and belief, this weight loss is attributable to moisture adsorbed on the crucible that is removed by subjecting the crucible to the extremely high temperature used in the purification process. Sample B, representing a graphite crucible that contained 20 g of added carbon but no cremated remains, lost just 1.2g during the purification process, which again is attributed to removal of adsorbed moisture from the crucible and from the added carbon. These results for Samples A and B show that the purification process *per se* removed very little elemental carbon from the crucible wall or the powdered carbon added to Sample B, in the absence of cremated remains.

6. Sample C is a graphite crucible containing 50g of remains. Sample C lost substantial weight during the purification process - 50.2g. Nonetheless, 15.1g. of powdered carbon were recovered from the remains. This shows two things.

7. First, the overall weight loss from the crucible and contents of Sample C (50.20g) was about equal to the 50g weight of remains originally charged to the crucible, but 15.1g of carbon were recovered from the 50.20g of remains, so 35.1g of the original remains was removed. The remaining 15g.1 of the overall weight loss is attributable to a reaction between the graphite wall of the crucible itself and the remains within to yield gaseous carbon compounds that were removed during the purification process. This shows an aggressive reaction between the remains and elemental carbon. Thus, the purification process itself, carried out on cremated remains, removed a substantial amount of carbon from the system.

8. Second, on information and belief, the carbon recovered from the remains in Crucible C survived the process intact because the crucible wall acted as sacrificial carbon to protect the carbon in the remains from reacting and being removed. This result shows that the presence of sacrificial carbon protected the carbon in the remains from being reacted and removed in gaseous form.

9. Now compare Samples C and D in the Table. Sample D differs from Sample C because 20g of elemental sacrificial carbon powder were mixed into the remains in Sample D before the purification process was carried out. 20g of carbon were recovered. This 20g of recovered carbon is the sum of the residual carbon from remains and the residual sacrificial carbon, which in this test could not be differentiated. Thus, about 5 g more carbon was recovered when 20g of sacrificial carbon was added.

10. Also in Sample D, where sacrificial carbon was added, the overall weight loss from all components (46.5g) was less than the corresponding loss from Sample C (50.2g), which contained as sacrificial carbon only the crucible wall itself. This shows that the added sacrificial carbon protected the crucible wall and the carbon from the remains better than the crucible wall alone did.

11. On information and belief, this experiment shows that additional carbon was recovered from the cremated remains by adding sacrificial carbon in Sample D, for the following reason. On information and belief, the added carbon interacted with the non-carbon constituents of the remains in the same way as the carbon in the remains did. Since nearly 5g more carbon was recovered in Sample D compared to Sample C, on information and belief some of the additional recovered amount came from the sacrificial carbon and some was additional carbon extracted from the cremated remains.

12. In sum, I have reached two conclusions from this experimentation.

13. I have demonstrated that cremated remains react with carbon, including the carbon in the remains itself and even the graphite crucible wall, during the described purification of the remains to produce pure graphitic carbon. This reaction consumes carbon from the remains in the form of a gas. Recovering carbon from cremated remains is not simply a matter of purifying cremated remains that contain carbon. The carbon in the cremated remains will be reduced or eliminated by the non-carbon constituents in the remains, unless steps are taken to protect the carbon in the remains from this reaction. In

Sample C, 15.1 grams of carbon were recovered from the remains only because graphite in the crucible wall provided protection for the carbon in the cremated remains.

14. I have demonstrated a reasonable basis for my opinion that adding sacrificial carbon to the cremated remains before purifying the remains and converting the remains to graphite increases the amount of carbon recovered from the remains.

15. I further declare that the statements made in this declaration of my own knowledge are true and the statements made in this declaration on information and belief are believed to be true. I have been warned that willful false statements and the like so made are punishable by fine or imprisonment, or both (Title 18 United States Code Section. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

3/2/04

DATE

Robert W. Froberg

Robert W. Froberg

# ATTACHMENT A

**ADVANCED CARBON TECHNOLOGIES, INC.**

220 MAIN STREET  
TOPTON, PA 19562

610-682-1086  
FAX: 610-682-3838

**WEIGHT LOSS EXPERIMENT ON  
LIFE GEM MATERIAL**

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE LOSS OF  
NONCARBON MATERIAL WHICH OCCURS DURING THE PURIFICATION AND HEAT  
TREATMENT OF CREMATION REMAINS (THEREAFTER CALLED THE MATERIAL).

THE PURIFICATION AND HEAT TREATMENT PROCESS PREPARES THE  
MATERIAL FOR SUBSEQUENT CONVERSION TO DIAMOND.

**SAMPLES**

THREE SAMPLES WERE PROCESSED IN THIS EXPERIMENT:

**SAMPLE A:** AN EMPTY CRUCIBLE  
EPTCR00081

**SAMPLE B:** A CRUCIBLE W/CARBON ADDITIVE  
ID# CONGL00081

**SAMPLE C:** A CRUCIBLE W/CARBON ADDITIVE PLUS THE MATERIAL  
ID# EXPLG00081

BY RECORDING THE WEIGHTS OF THE SAMPLES BEFORE AND AFTER  
PROCESSING, ONE CAN DETERMINE THE WEIGHT LOSS WHICH OCCURS DURING  
PROCESSING OF THE MATERIAL.

**PROCESS**

THE SAMPLES WERE PROCESSED AT THE SAME TIME (IN THE SAME  
FURNACE RUN). THE PROCESS DEVELOPED BY ADVANCED CARBON  
TECHNOLOGIES CONSISTS OF HEATING THE MATERIAL IN AN INERT  
ATMOSPHERE TO AN EXTREMELY HIGH TEMPERATURE AND EXPOSING THE  
MATERIAL TO CHLORINE GAS WHILE AT THE HIGH TEMPERATURE.

DURING THE PROCESS, NONCARBON ELEMENTS ARE REMOVED FROM THE  
MATERIAL, AND THE CARBON REMAINING CHANGES IN CRYSTAL STRUCTURE  
AND BECOMES SUITABLE FOR USE IN DIAMOND MANUFACTURING.

HIGH PURITY GRAPHITE PRODUCTS

**ADVANCED CARBON TECHNOLOGIES, INC.**220 MAIN STREET  
TOPTON, PA 19562610-682-1086  
FAX: 610-682-3838**DATA**

ALL THREE SAMPLES WERE CONTAINED IN A GRAPHITE CRUCIBLE MACHINED TO THE SAME DRAWING (SAME SIZE, SHAPE, AND WEIGHT).

**SAMPLE A (EMPTY CRUCIBLE)**

WEIGHT BEFORE	434.20 GRAMS
WEIGHT AFTER	<u>433.50</u> GRAMS
WEIGHT LOSS	0.70 GRAMS

**SAMPLE B (CRUCIBLE W/19.98 GRAMS CARBON ADDITIVE)**

WEIGHT BEFORE	454.18 GRAMS
WEIGHT AFTER	<u>453.20</u> GRAMS
WEIGHT LOSS	0.98 GRAMS

**SAMPLE C (CRUCIBLE W/11.90 GRAMS CARBON ADDITIVE PLUS 11.90 GRAMS MATERIAL)**

WEIGHT BEFORE	458.00 GRAMS
WEIGHT AFTER	<u>449.60</u> GRAMS
WEIGHT LOSS	8.40 GRAMS

**RESULTS**

IN CALCULATING THE WEIGHT LOSS OF THE MATERIAL, ONE MUST ALLOW FOR THE WEIGHT LOSS OF THE CRUCIBLE AND THE WEIGHT LOSS OF THE CARBON ADDITIVE.

1) TOTAL WEIGHT LOSS OF SAMPLE C:	8.40 GRAMS
2) CRUCIBLE WEIGHT LOSS:	0.70 GRAMS
3) CARBON ADDITIVE WEIGHT LOSS:	<u>0.16</u> GRAMS
(1-2-3) ACTUAL MATERIAL WEIGHT LOSS	7.54 GRAMS

PERCENT MATERIAL WEIGHT LOSS IS:  
 $7.54 \text{ GRAMS DIVIDED BY } 11.90 \text{ GRAMS} = 63\%$

BASED ON THE ABOVE, 63 PERCENT OF THE MATERIAL IS LOST DURING PROCESSING LEAVING 43 PERCENT FOR USE IN DIAMOND MANUFACTURING.

*HIGH PURITY GRAPHITE PRODUCTS*

**ADVANCED CARBON TECHNOLOGIES, INC.**

**220 MAIN STREET  
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**CONCLUSIONS**

1. THE AMOUNT OF WEGHT LOSS WILL VARY AS A RESULT OF THE CREMATION PROCESS AND THE CHEMICAL COMPOSITION OF THE MATERIAL.
2. ALTHOUGH NO ANALYSIS WAS DONE IN THIS EXPERIMENT, IT IS ASSUMED THAT THE MATERIAL LEFT AFTER PROCESSING IS CARBON.

*HIGH PURITY GRAPHITE PRODUCTS*



**ADVANCED CARBON TECHNOLOGIES, INC.****220 MAIN STREET  
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FAX: 610-682-3838****COMMENTS ON WEIGHT  
LOSS EXPERIMENT  
USING LIFE GEM MATERIAL****SAMPLES A AND B**

THESE DATA ARE STRAIGHT FORWARD IN THAT THERE IS SIMPLY A WEIGHT LOSS IN BOTH CASES DUE TO MOISTURE LOSS WITH NO CHEMICAL REACTIONS. THE VALUE OF THESE DATA IS TO SHOW THAT THE ATMOSPHERE IN THE FURNACE DOES NOT CAUSE GRAPHITE (CRUCIBLE OR ADDITIVE) TO OXIDIZE.

**SAMPLE C**

IN THIS CASE, 50 GRAMS OF MATERIAL WERE PLACED IN A GRAPHITE CRUCIBLE. DURING HEAT TREATING, THE NONCARBON MATERIAL REACTS WITH THE GRAPHITE CRUCIBLE. THESE NONCARBON MATERIALS INCLUDE OXIDES OF CALCIUM, SODIUM, AND OTHER ELEMENTS. THE DATA INCLUDES THE WEIGHT OF POWDER (CARBON) LEFT IN THE CRUCIBLE. THE WEIGHT LOSS INCLUDES OXIDATION WEIGHT LOSS OF THE GRAPHITE CRUCIBLE AS WELL AS THE NONCARBON MATERIAL.

**SAMPLE D**

IN THIS CASE, CARBON (GRAPHITE) POWDER WAS ADDED TO THE MATERIAL. THE ADDED CARBON REACTS WITH THE NONCARBON MATERIAL SO THERE IS MORE CARBON REMAINING FROM THE MATERIAL AND LESS CRUCIBLE OXIDATION WEIGHT LOSS. THE ADDED CARBON POWDER IS INTENDED TO REACT WITH THE OXIDES IN THE MATERIAL SO AS TO PRESERVE MORE CARBON FROM THE MATERIAL.

*HIGH PURITY GRAPHITE PRODUCTS*